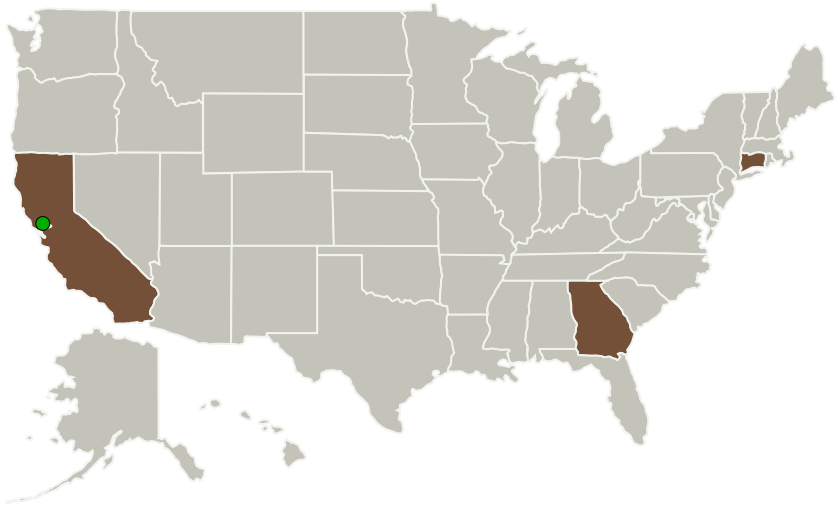
Prognostics Enhancemend Fault-Tolerant Control with an Application to a Hovercraft, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

Fault-Tolerant Control (FTC) is an emerging area of engineering and scientific research that integrates prognostics, health management concepts and intelligent control. Impact Technologies and the Georgia Institute of Technology, propose to build off of a strong foundation in fault-tolerant control (FTC) research performed with NASA in past years to mature the applicability of this technology and push the envelope on the capability and breadth of the technology itself. We are introducing for this purpose two novel concepts to expand the scope of fault tolerance and improve the safety and availability of such critical assets. Building upon the successes of Phase I, we will develop and apply to the hovercraft (a targeted testbed) a reconfigurable control strategy that relies on current prognostic information to maintain the platform's stable operation and complete its mission successfully. The second innovation to be introduced refers to a challenging problem encountered in complex systems such as aircraft platforms: A multitude of critical system components can not be monitored directly due to a lack of appropriate sensing modalities. We will introduce a Model Based Reasoning approach and frequency demodulation tools to resolve the ambiguity and "unmask" those fault variables that can not be observed directly.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Sikorsky Aircraft Corporation	Lead Organization	Industry	Stratford, Connecticut
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
Georgia Institute of Technology-Main Campus(GA Tech)	Supporting Organization	Academia	Atlanta, Georgia

Primary U.S. Work Locations	
California	Connecticut
Georgia	

Project Transitions

July 2011: Project Start

June 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139354)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Sikorsky Aircraft Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

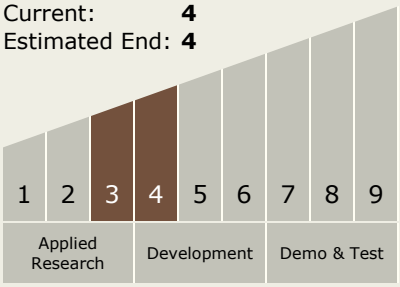
Carlos Torrez

Principal Investigator:

Michael Roemer

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.4 Execution and Control

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System